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14. ABSTRACT

Throughout armed conflict, fratricide has been a concern for all sides involved. The number of fratricide incidents has steadily been reduced over time. This has been a result of improvements in weapon technology, tactics, techniques and procedures and improved situational awareness. However, fratricide still poses a major threat to troops operating in today's battlespace. It has far reaching strategic and operational impacts that cannot be overlooked in today's international environment. As improvements are made in joint doctrine, data link systems and training in an attempt to prevent fratricide from occurring altogether, human factors in conjunction with increased non-linearity and speed of combat operations will make it impossible to completely eliminate fratricide incidents.

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FRATRICIDE: A DILEMMA WHICH IS MANAGEABLE AT BEST

by

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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9 February 2004

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Introduction

Throughout the history of armed conflict, fratricide has been a reality for all forces involved. The Training and Doctrine Command defines fratricide as "the employment of friendly weapons and munitions with the intent to kill the enemy or destroy his equipment or facilities, which results in unforeseen and unintentional deaths or injury to friendly personnel."[1] This paper examines fratricide strictly from a blue-on-blue engagement standpoint; incidents involving non-combatants and collateral damage will not be discussed. Friendly fire incidents have occurred across all modes of combat, to include air-to-air, air-to-surface, surface-to-air and surface-to-surface engagements. Over time, technological improvements in weaponry, tracking devices, and tactics, techniques and procedures (TTP) have helped to reduce numbers of friendly fire incidents in such engagements. Compare the losses in World War I, where it is believed that allied artillery was responsible for over one million French casualties,[2] to a total of 36 U.S. casualties in Operation Desert Storm.[3] Although the difference in these numbers is staggering and may not be considered an acceptable comparison when considering the duration of each conflict, the percentage of friendly fire incidents with respect to the total number of combat deaths cannot be overlooked. In Vietnam, fratricide accounted for approximately five percent of U.S. ground casualties.[4] In Desert Storm it accounted for almost twenty-five percent of all U.S. casualties.[5] Such incidents have occurred in all four types of engagements during recent combat Operations Enduring Freedom (OEF) and Iraqi Freedom (OIF). The importance of mitigating such events has never been greater than in today's international arena. The strategic and operational implications of such events have forced all military services to put fratricide at the top of their agendas. They are now examining ways to prevent fratricide from occurring altogether. As General Tommy Franks stated in June 2003,

> "Someone made the comment to me the other day that we've had amazingly few casualties. And I said, 'Well, I don't know about that.' The perfect plan spends no treasure and has no casualties. We have spent treasure and we have had casualties. I believe that we ought to all recognize that if you're a mom, dad, a husband, a wife of someone lost in a war, the casualties have not been low."[6]

Although improvements in technology and TTPs have served to reduce the number of fratricide incidents in combat operations, human factors, in conjunction with the substantial increases in the speed and non-linearity of current and future combat operations, will make it impossible to completely eliminate fratricide incidents.

Impact of Fratricide

Fratricide has many consequences. On the strategic side, such incidents can cause the loss of coalition support. On April 18, 2002, two U.S. F-16s mistakenly dropped several 500 lb bombs on a Canadian ground unit conducting live-fire training in Afghanistan, killing four soldiers.[7] Calls for Canada's military to "pull out of the Afghan mission."[8] were widespread as a result of this incident. Additionally, legal action against the F-16 pilots is currently taking place--one of the two pilots will be facing charges in a general court martial in the near future. Another air-to ground fratricide incident during OIF, involving a U.S. A-10 mistakenly firing on a British convoy, killing one soldier and injuring three others,[9] could produce similar results in the United Kingdom. This incident was virtually a repeat of a Desert Storm incident in 1991.

During a time of rapid globalization it is critical now more than ever to maintain coalition support in such operations. Loss of coalition support can de-legitimize our actions, leading to political and economic ramifications. Nationally, such incidents may lead to a loss of public support for our efforts. Today's media plays a large part in publicizing negative news events, by emphasizing not only combat deaths as a result of enemy fire, but also as the result of friendly

fire. As many countries have determined, the American will to support sustained combat operations is viewed as our strategic center of gravity. This loss of support may seem critically important to political leaders during election time, again shifting emphasis to prevent such actions.

Fratricide has many operational implications as well. Morale of friendly forces can be seriously affected by such incidents, not only for the individuals responsible for the act, but also for those that knew the soldiers that were killed or injured. Mistrust, loss in confidence of leadership and disbelief in the purpose of their actions may begin to surface, thus seriously impacting the effectiveness of operations.[10] Once an incident occurs, the tempo of operations may also be adversely affected. Leaders may want to slow the pace of operations to ensure such an incident is not repeated, thus playing against the principle of seizing the initiative. Senior leaders may take further action to prevent fratricide by micro-managing their troops' actions as a result of the level of attention placed on such incidents.[11] Fratricide can also force leaders to develop strict and overly complex rules of engagement (ROE).[12] This over-supervision contradicts the principle of decentralized execution. A fratricide incident may cause friendly forces to second-guess their intelligence information or over-analyze a situation to prevent the reoccurrence of such an incident. This will inherently force troops to slow down their pace of operations or hesitate taking action to the point where it may be fatally dangerous, allowing the enemy to seize the initiative and kill before being killed.[13] In the age of time-critical targeting, such incidents are detrimental to achieving the objective.

Moreover, investigating such incidents is time consuming and expensive causing a reduction in manpower and redirection of assets. The investigation of the F-16 pilots who mistakenly bombed the Canadian forces in Afghanistan is still ongoing and has affected operations in all the

manners described above. If the incident was caused by equipment failure or lack of knowledge of the system, forces may decide not to use that equipment for the duration of the operation, even if the equipment would substantially aid forces in achieving their objective. Such was the case on December 4, 2001, when U.S. Special Forces called in an air strike by a B-52 with Global Positioning Satellite (GPS) System weapons on their own position.[14] This incident was the result of equipment battery failure and lack of equipment training by the ground unit. Although the manner in which the B-52 was employed was fairly new and very effective, such sorties were temporarily halted. Finally, the monetary cost of such incidents cannot be overlooked. In the age of multi-billion dollar aircraft and reduction in forces, one fratricide incident can have a devastating effect, not only in dollars, but also in number of assets available.

Reductions in Fratricide Incidents

The number of fratricide occurrences in combat operations has been substantially reduced over time. Technological improvements in weaponry have played a significant part in this reduction. The development of precision and near-precision weaponry, such as the GPS-guided Joint Direct Attack Munition and laser-guided bomb, has given allied forces the capability to strike the enemy with nearly pin-point accuracy. By reducing the circular error probability (CEP) of gravity weapons from several hundred feet to only a few meters, such weapons have allowed friendly ground forces to conduct operations in close proximity to enemy forces while calling in air strikes from aircraft outside visual range of these forces. The development of data links and combat identification (CID) devices, such as Identification of Friend or Foe (IFF) technology to give operators a sound common operating picture (COP) has substantially improved the situational awareness of those giving orders as well as those carrying them out.

The IFF system was developed during the Vietnam War for ground and air assets and consisted of essentially a radio transponder that sent a coded message to another transponder that could identify the asset as a friendly force. These earlier systems were prone to interference or mimicking, or were not universally employed as newer versions were developed.[15] However, improved IFF systems are used on almost all air assets in the U.S. military today. Although the U.S. has come a long way since the Battle of the Bulge in World War II, where "over 750 casualties occurred as a result of U.S. bombers attacking American ground forces [First Infantry Division in St. Lo],"[16] the superiority of American weapon systems has led the American public to demand an explanation and a solution for any such deaths.

Doctrine's Role in Preventing Fratricide

As the U.S. military attempts to do more missions with fewer assets, it is now forced to use assets in a joint capacity to accomplish the mission objective in the most effective and efficient manner possible. As a result, there has been a substantial increase in the number of joint operations since the early 1990's, during which the U.S. military underwent a significant force reduction. In today's operations, the mission that forces may be tasked to accomplish and the manner in which they may be employed may not necessarily coincide with the dedicated mission the specific unit or asset was intended to perform. Forces must be flexible to respond to almost any tasking and be prepared to conduct such operations with little or no advance notice. For example, in OEF B-52s were serving in a Close Air Support (CAS) role while flying at 40,000 ft.[17] Most aircrews involved in such missions never received any formal CAS training, yet were called upon on numerous occasions to execute such missions, a role that strategic bombers had not played since Vietnam. The success of these missions required the Army and Air Force to

change TTPs concerning CAS. Unfortunately, significant momentum to increase joint training did not develop until after the previously mentioned friendly fire incident occurred involving a B-52 and ground forces. Most existing joint publications make only vague references to fratricide, its causes and how to avoid it. JP 3-02, Doctrine for Amphibious Operations, provides only general references to preventing fratricide when discussing the principle of Providing Safeguards and Survivability during Fire Support Coordination:

> Detailed integration is required to prevent fratricide. SACC and FFCC seek to prevent fratricide at all levels and situational awareness. Three dimensional radars and digital data links should be used for safeguards and for enhancing survivability. Use of FSCMs, coordination of positions areas, and the consideration of the locations of friendly forces during target analysis all contribute to safeguarding friendly units.[18]

Although it does suggest the use of data links to help situational awareness by building a COP, there are a substantial number of data links issued to forces that are not compatible, thus making the COP not so common. Other joint publications, such as JP 3-02.1, Joint Doctrine for Landing Force Operations, and JP 3-06, Doctrine for Urban Operations, make no reference to fratricide. However, JP 3-09.3, Joint Tactics, Techniques and Procedures for Close Air Support, has undergone a modest revision since 1995 on the topic of fratricide. The latest version of JP 3-09.3 highlights specific ways to minimize the possibility of fratricide:

> Items such as detailed mission planning, standardized procedures for friendly force tracking and supporting immediate air requests, realistic training/mission rehearsal, use of friendly tagging or tracking devices, and effective staff, forward air controller/air officer and air liaison officer coordination, and sound clearance of fire procedures can significantly reduce the likelihood of fratricide.[19]

JP 3-09.3 revisions also significantly expand on CAS participant responsibility:

> Each participant must make every effort possible to correctly identify friendly units and enemy forces prior to targeting, clearing fires, and weapon release. CID is the process of attaining an accurate characterization of detected objects to the extent that high confidence and timely application of military options and weapon resources can occur. Depending on the situation and the operational decisions that must be made, this characterization may be limited to “friend,” “enemy” or “neutral.” In other situations,

> other characterizations may be required including, but not limited to, class, type, nationality, and mission configuration. CID characterizations, when applied with rules of engagement (ROE), enable engagement decisions and the subsequent use, or prohibition of use, of lethal and nonlethal weaponry to accomplish military objectives. CID is used for force posturing, command and control (C2), situational awareness as well as shoot, no-shoot employment decisions.[20]

These changes in CAS joint doctrine are a direct result of CAS friendly fire incidents during OEF. As a result of lessons learned from OIF, the Commander, U.S. Joint Forces Command, Admiral Edmund Giambastiani, Jr., wrote in an October 2003 Pentagon report that the military will make comprehensive changes to its war-fighting doctrine and establish new training methods to "ensure an ever-transforming dominant joint force."[21]

Current Technological Efforts to Prevent Fratricide

Recent studies by the U.S. Air Force and Army into the causes of fratricide showed that improved situational awareness by the use of friendly force tracking devices that aid in developing a COP could substantially reduce the occurrence of fratricide.[22] Such efforts to develop CID tracking devices have been underway for several years. Shortly after Desert Storm, the Pentagon conducted research to develop a CID system. One such system, known as the Battlefield Combat Identification System (BCIS), used a coded transmitter and receiver on ground vehicles that would interrogate other vehicles carrying the system (similar to an IFF system). The Army determined that the system would have cost as much as $40,000 per vehicle. As it was intended to be added to other assets, to include U.S. and coalition aircraft, Army officials decided that the whole program was cost prohibitive. The program was scrapped in 2001 since it was only compatible with ground forces and not air assets.[23]

The U.S. continued the development of tracking systems which were eventually issued to ground troops during OEF and OIF. U.S. Marines operated the Mobile Data Automated

Communications Terminal (MDACT) tracking system. MDACT consisted of a secret, line-of-sight (LOS) communications system that depended on the Enhanced Position-Location Reporting System (EPLRS) data radio.[24] Units would send their location and the location of enemy forces encountered in their operating area across the tactical data-link network to develop a COP for forces operating in the same vicinity. Unfortunately, the size of the Marine Expeditionary Force (MEF) operational area and the rapid advancement of the maneuver units caused the forces utilizing MDACT to exceed the LOS capabilities of the system.[25] According to lessons learned from OIF by the First Marine Division, MDACT required extensive operator and network engineer training to operate properly.[26] Additionally, MDACT information was not compatible with other systems providing tracking information to develop the COP.[27]

A second type of tracking system known as Force XXI Battle and Command Brigade and Below (FBCB2) or Blue Force Tracker (BFT) system, used a commercial L Band satellite communication system managed by the Army to transmit location information via text messaging or friendly tracking devices and incorporated a graphic display that showed the position of friendly forces as well as enemy forces.[28] Although the system was easier to operate than MDACT and was not limited by LOS, it had several drawbacks. Bandwidth limitations prevented large amounts of data from being transferred over the satellite system. "Sending files or pictures was too slow to be useful during combat."[29] Also, it was noted that there was a delay, known as latency, in transmitting data to command center receivers. Some delays in position updates lasted as long as five minutes. Such delays in updating position of friendly forces could have proved fatal. This latency was further magnified by the rapid advance of ground operations.[30] The system also allowed the user to remotely render the system inoperative should the possibility of the system falling into enemy hands arise.[31] However, if it was unknown that a

system was captured by enemy forces, it may have allowed them to pass for friendly forces.[32] Overall, U.S. ground forces issued FBCB2 highly praised its performance. However, the system was not compatible with data link systems of other assets, to include U.S. aircraft and other coalition ground force assets. Had these systems been compatible they could have played a part in preventing several air-to-ground fratricide incidents in OIF, such as the accidental targeting of a British convoy by a U.S. A-10, resulting in one British casualty, or the bombing of U.S. ground forces by an F-15E, killing one U.S. soldier.[33] The issue of incompatibility was further aggravated by the sheer number of variations of MDACT and BFT-type systems employed throughout the course of OIF. Several different tracking systems, none of which interfaced directly with any other tracking system, were employed in theater, all on U.S. assets.[34]

In 1997, Britain, France, Germany and the U.S. agreed on the development of a Battlefield Target Identification Device (BTID) using a "millimeter wave-based interrogation system."[35] BTID is not expected to enter service until 2006. Until such devices can be employed, coalition forces must rely on visual recognition or voice communication to correctly establish their position. Visual recognition devices have been used by friendly forces since World War II. During the invasion of Normandy in June of 1944, allied aircraft were painted with black and white invasion stripes to prevent fratricide. A similar optical marker (left-hand arrow-head placed on the top, front and sides of vehicles) was used by coalition ground forces during OIF.[36] For night operations, the Army developed a Combat Identification Panel System (CIPS), comprised of a thermal tape-covered corrugated aluminum device that appeared through thermal sights as a contrasting spot against vehicle hulls, providing some air-to-ground fratricide utility. However, such panels could fall off of vehicles and be recovered by enemy forces as well.[37] The Target Identification Panel System (TIPS) was a thermal tape-marked cloth that mounts on

top of the vehicle for the purpose of air-to-ground identification.[38] Aircrews also receive recognition training on coalition and enemy forces and are provided recognition charts for use in flight. Despite the use of these visual markings, air-to-ground fratricide incidents, such as the A-10/British convoy accident, still occurred.

The Human Element

Improvements in joint TTPs, as well as weapon technology and tracking devices may help prevent fratricide, but the final link in the fratricide chain is the human decision to fire the weapon. Although the soldier may have received all the appropriate training and has access to a complete and accurate operating picture, the possibility for making a mistake still exists. The complexity of the current and future battlefield (encompassing simultaneous attacks from many directions over a very short time, using complex weapon and communication systems and vast amounts of intelligence) can serve to overload the shooter.[39] In a time constrained environment, this may cause the soldier to mistakenly discharge his weapon on friendly forces.

Another human factor that may indirectly lead to blue-on-blue engagements is *risk homeostasis*. Safety engineers have constantly dealt with this concern when improving safety of existing systems. Risk homeostasis states that "if actions are taken to make a system safer, operators will simply take advantage of that safety margin to take correspondingly more risks, to the point where the level of safety remains constant."[40] It must be understood in this situation that the level of risk that the operator is willing to take is at a level "acceptable" to that individual, based on the specific case or situation, and may differ between operators.[41] An example of risk homeostasis involves the use of near-precision weapons in a CAS role. The individual tasked to launch the weapon understands that the CEP of such a weapon is rather

small and that the danger of the weapon straying from its intended target and striking friendly troops in the vicinity is minimal. Therefore, he may strictly rely on enemy location information provided by the ground forces to target the weapon, even though the forces may be beyond visual range, trading risk in weapons accuracy for risk in targeting. The fact is that incorrect location information can combine with greater weapon accuracy to create a situation even more hazardous to friendly forces. Such was the case with the B-52 incident in Afghanistan.

Finally, battle stress can play a significant part in friendly fire incidents. As military forces are directed to accomplish more taskings with less forces, soldiers are stretched to their physical limits, not only because of the vast array of firepower and communications equipment they must carry, but because they may be required to conduct many successive combat operations without a break.[42] As the speed at which troops advance across the operations area increases dramatically, soldiers are required to conduct a larger number of engagements, although possibly smaller in scope, over the same amount of time. The resulting fatigue can be detrimental to ground forces conducting urban operations, such as in the latter stages of OIF, where it was extremely difficult to obtain an accurate COP, and soldiers mainly had to rely on visual identification to accomplish CID. With only visual recognition available while conducting offensive operations in an unfamiliar environment, fatigue makes all ground forces susceptible to friendly fire.

Possible Solutions to Mitigating Fratricide

As lessons learned from OIF and OEF are revealed, no simple improvement in technology can solve the problem of fratricide. Although friendly force tracking/data link capability and COP development have improved significantly, they alone cannot eliminate fratricide incidents. The total number of fratricide incidents has dramatically fallen since World War II, but the

increased speed of ground operations, increased number of joint operations and shift to extensive urban combat engagements have all helped to increase the percentage of friendly fire casualties.

The Air Force recently examined the fratricide issue and identified several findings and recommendations. From a doctrinal perspective it discovered that "fast-paced, non-linear ground operations presented significant challenges for maintaining situational awareness on blue force positions and that each operating environment had unique procedures, perspectives and considerations for fratricide."[43] It recognized that fratricide prevention is embedded in joint and Air Force doctrine to varying degrees and that equipment and training are the primary areas to focus attention.[44] "Training and adherence to joint doctrine is the only technologically independent way to reduce fratricide."[45] It recognized the importance of making the Air Force's primary data link system, LINK 16, compatible with Army tracking systems and the criticality of "folding in" the Army, Marine Corps and coalition roadmaps for future combat identification systems.[46] Lt Gen Dan Leaf, Vice Commander, Air Force Space Command, stated that the development of such a compatible system is key to ensuring that "we have a consistent, coherent approach to putting everything together that goes into that kill-chain decision to squeeze the trigger or hit the pickle button."[47]

In the development of future doctrine, the Air Force will emphasize the difference between CID and situational awareness. It will also develop a ROE matrix using existing capabilities to differentiate between positively identifying the location of hostile forces versus knowing there is only a lack of friendly forces. Finally, the Air Force proposed designing realistic joint training scenarios that include potential fratricide situations simulating live ordinance.[48]

In conjunction with the Army, the Air Force has developed a program known as the Army Close Air Support/Situational Awareness (A CAS/SA) Initiative in an "attempt to ultimately

eliminate fratricide between the two services and to enhance joint combat efforts."[49] Although some processes already exist today that link Army and Air Force systems together, "latency problems and lack of clear details exchanged at the appropriate echelons contribute to unnecessary fratricide and missed enemy engagements."[50] The Air Force-sponsored Joint Expeditionary Force Experiment (JEFX) '04 will attempt to demonstrate the compatibility of Air Force and Army data link systems during a CAS exercise. JEFX '04 will show that the possibility of fratricide may be reduced by effectively linking these systems, thus providing a shared ground picture and air picture of ground unit air operations.[51]

Army lessons learned included the following: the need to standardize tactical air controller training and equipment across the Department of Defense; emphasize IFF procedures and developing a standardized battlefield identification system; ensure positive target identification before engagement down to the lowest level; ensure leaders maintain control and distribution of direct fires; emphasize aggressive combat situational reporting.[52] As a result of these recommendations, the Army established several CID capabilities required in future platforms, to include CID of forces under all battlefield and adverse weather conditions, interface with information/intelligence networks for the development and maintenance of the COP and compatibility with the Land Warrior-Future Combat System (dismounted soldier position location) and the NATO-mounted BTID.[53]

Currently, the Army is working on the Coalition Combat Identification Advanced Concepts Technology Demonstration (CCID ACTD) which focuses on testing solutions to reduce "fratricide and enhance combat effectiveness of U.S. and Allied (NATO and ad hoc) coalition forces."[54] Additionally, the Army is working with Joint Forces Command and the Joint Combat Identification and Evaluation Team to coordinate joint exercises in support of ACTD objectives.

Such an exercise demonstrating the capability of a dismounted device was conducted in August 2003.[55] The Army is also taking the lead in the development of the Single Integrated Air Picture, which consist of "common, continual, and unambiguous tracks of airborne objects of interest in a theater surveillance area. Intended for U.S., allied, and coalition partners, it will facilitate attack operations, aviation deep operations, air and missile defense, …and battlespace situation understanding/awareness."[56] Finally, the Army is also developing the Single Integrated Ground Picture, which will continue current work on FBCB2.[57]

The findings of the Air Force and the Army have one very important element in common. Both share the view that technological improvements in data link systems and a COP must be researched, but that joint doctrine development and adherence to TTPs are essential to minimizing the likelihood of fratricide. These findings can apply to Marine Corps and Navy actions as well.

Conclusion

In an age of network centric operations, the compatibility of networks providing the preponderance of information to develop predictive battlespace awareness is essential. However, technological improvements and improved situational awareness will not prevent fratricide from occurring altogether. There must be dramatic improvements in joint doctrine, TTPs and exercises in order to mitigate friendly fire. The human element, present at every level of decision making before a weapon is launched at a target, is the most critical link in the fratricide chain.

As combat operations become more non-linear and are conducted at ever increasing speeds, one must consider minimizing the risk of fratricide by using all means available. This includes

reconsidering the necessity to seize the initiative and accomplish the assigned mission in the shortest time possible, versus the most efficient and safest manner possible. As the importance of preventing fratricide has increased over the past few decades due to its far reaching implications, commanders are now required to place greater emphasis on training to prevent such incidents as well as to ensure they are accurately monitoring the condition of forces operating in the battlespace. Although the human element is only one portion of the fratricide link, it is the one portion of the link that is prone to repeat the same errors in judgement, regardless of improvements in technology. Because of this fact and the fact that a human will probably be in the decision making process when employing weapons, fratricide incidents can only be limited and perhaps never completely prevented.

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